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(71) Applicant(s)

**Societe des Eaux de Volvic**  
**(Incorporated in France)**  
**63530, Volvic, France**

(72) Inventor(s)

**Laurent Aimé Stiz**

(74) Agent and/or Address for Service

**Mathys & Squire**  
**100 Grays Inn Road, LONDON, WC1X 8AL,**  
**United Kingdom**

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(56) Documents Cited

**GB 2124543 A EP 0247566 A2 EP 0199576 A2**  
**US 3900120 A**

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**AT15P, B8D DCD DCE DCW10 DCW9**  
**INT CL<sup>7</sup> B29C 49/00**  
**ONLINE:WPI,EPODOC,JAPIO**

(54) Abstract Title

**Preform for manufacturing a large capacity bottle and a bottle so made**

(57) A preform (1) made from a thermoplastic material, in particular PET, for manufacturing large capacity bottles of at least about 5 litres by blowing or steam-blowing, is of a generally cylindrical shape in revolution and is characterised in that the preform (1), including its neck (4), which is already formed to its final dimensions, has an external diameter ( $\phi$ ) of at least 48 mm, preferably between about 48 and 60 mm and in practice approximately 50 mm. The upper part of the bottle may have an inclined, substantially flat region on which the bottle may be laid down.

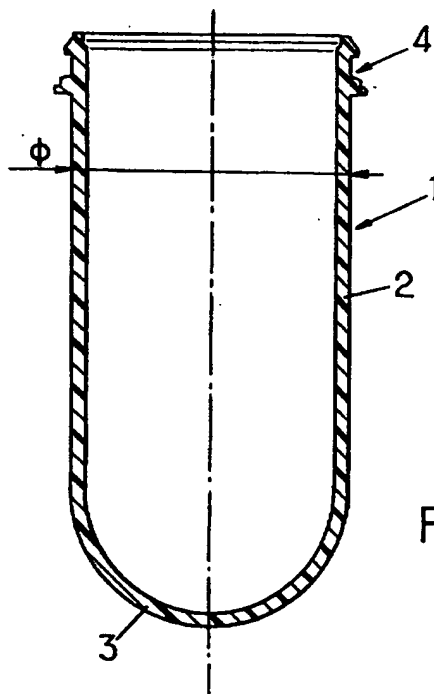


FIG.1.

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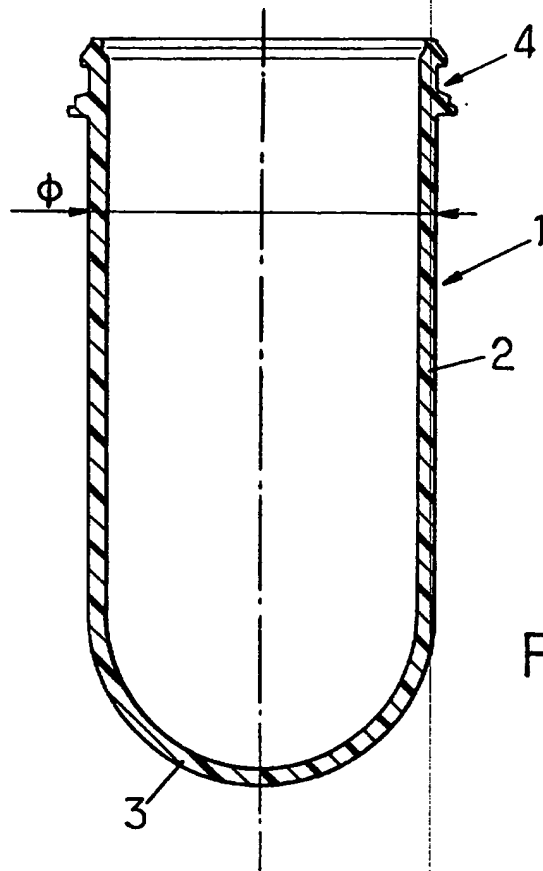


FIG. 1.

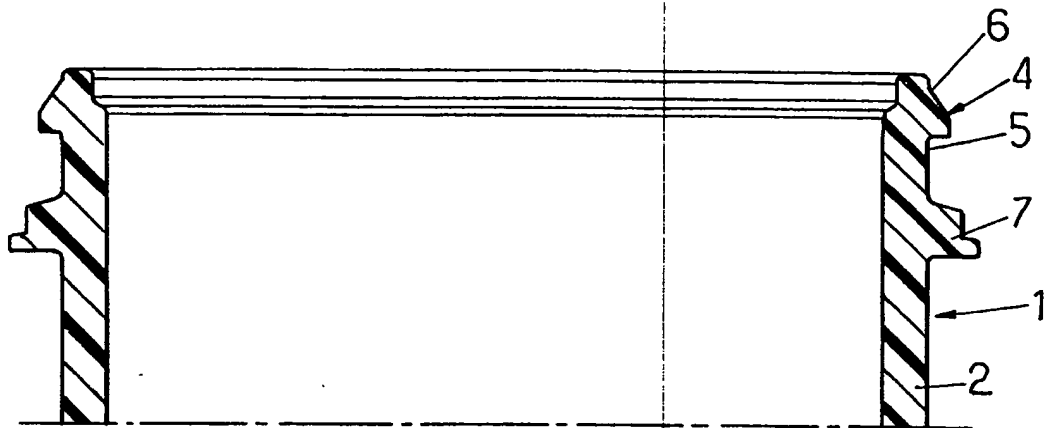


FIG. 2.

FIG.3.

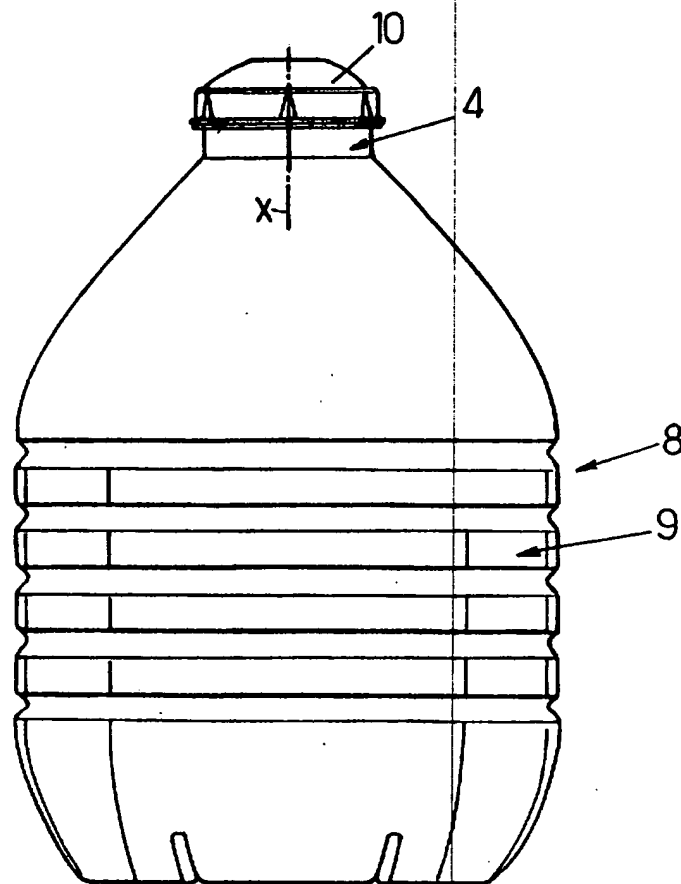


FIG. 4.

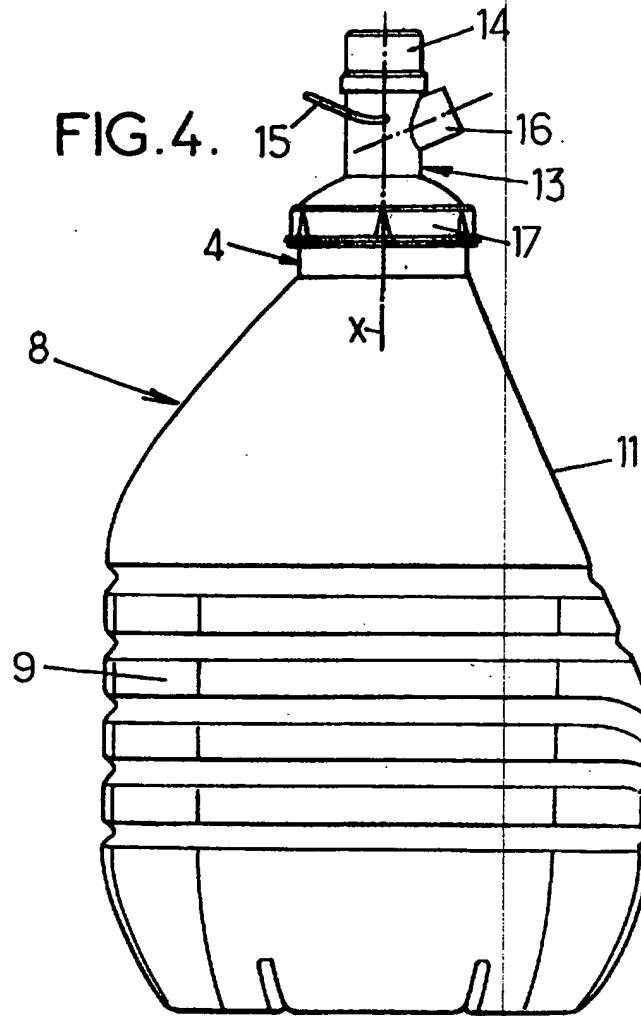
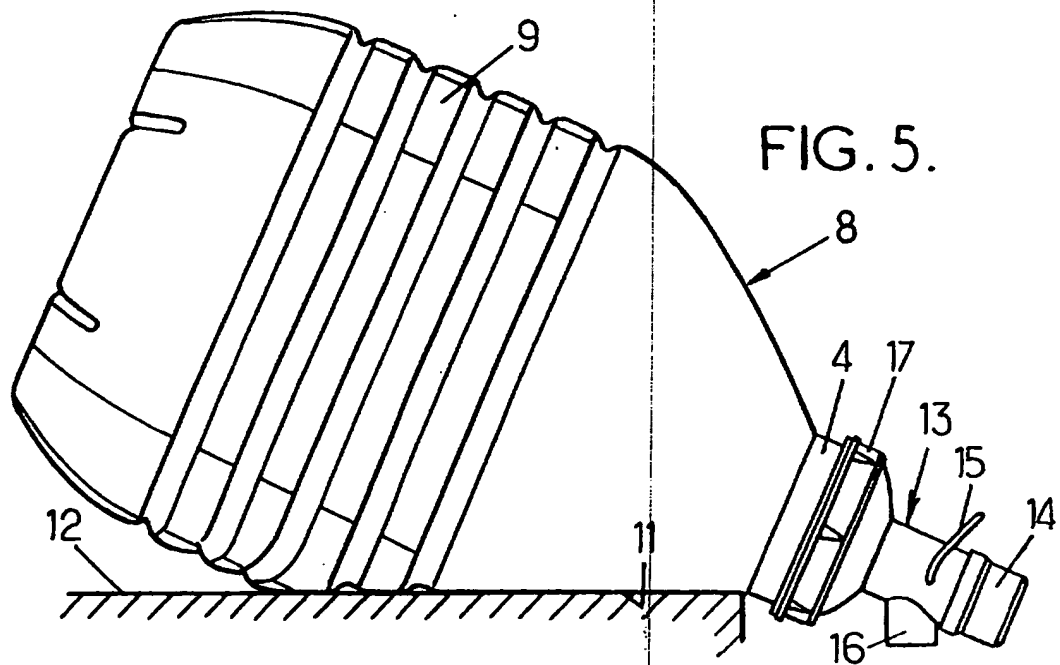


FIG. 5.



**PREFORM FOR MANUFACTURING A LARGE CAPACITY  
BOTTLE AND BOTTLE SO MADE**

The present invention relates to improvements made  
5 in the manufacture of bottles of a relatively large  
capacity, that is, at least approximately 5 litres and  
made from a thermoplastic material, in particular PET,  
said bottles being obtained by blowing or steam-blowing  
a heated preform of a generally cylindrical shape of  
10 revolution.

Large capacity bottles in the region of some 5  
litres are already used as a means of distributing  
drinking water such as spring water or mineral water.  
These bottles are of a relatively squat design having a  
15 body of a comparatively large transverse dimension  
relative to their height. For example, this transverse  
dimension (diameter if the body is round) may be roughly  
the same as the height or just slightly short of the  
height.

20 When manufacturing a bottle of this design by  
blowing or steam-blowing, the heated plastics material  
(for example PET or PEN) is subjected to a very high rate  
of elongation if starting with a preform of a standard  
shape (which is of a generally cylindrical shape in  
25 revolution with an external diameter of approximately 25  
to 27 mm). It should be pointed out that this stretching  
is much more prevalent in the transverse direction than  
vertically as compared with a standard 1.5 litre or 2  
litre bottle of a slightly greater height but much  
30 smaller diameter, in which case stretching is greater in  
the axial direction than in the transverse direction.

The difficulties inherent in transverse stretching

are all the more acute if the body does not have a rounded section but has a more or less square section with rounded corners. In this case, the material has a smaller thickness in the corner regions where stretching  
5 is at its maximum.

Of course, technical solutions have been found as a means of overcoming these drawbacks, in particular by heating the preform to a greater degree in the regions where stretching is at a minimum so that they are  
10 stretched more easily, and so that the thickness of the material at these points assumes a value more or less the same as that of the corners.

However, these solutions require specific adjustments to be made to the means used to heat the preforms and/or moulding means and have therefore proved  
15 expensive.

The main purpose of the invention is to provide a simple solution that is inexpensive to implement and which does not require any substantial modification to  
20 the heating and moulding equipment.

To these ends, the invention provides a preform made from a thermoplastic material, in particular PET, for manufacturing large capacity bottles, having a capacity of at least approximately 5 litres by blowing or steam-  
25 blowing, said preform being of a generally cylindrical shape in revolution and said preform, as proposed by the invention, being characterised in that it has an external diameter, including its neck, which is already formed and is so to the final dimensions, of at least about 48 mm.  
30 Preferably, the external diameter is between about 48 and 60 mm. In practice, in the particular case of a preform typically designed for manufacturing a bottle with a

height in the order of 230 mm and a body with a rectangular section of about 185 x 150 mm, with generally rounded corners, the external diameter is approximately 50 mm.

5        Advantageously, the neck has an external annular groove so that the closure of the bottle can be fixed onto the neck by a push-fit action in said groove.

      In accordance with a second embodiment, the invention provides a large capacity bottle, having a  
10        capacity of at least approximately 5 litres, wherein said bottle, being designed as proposed by the invention, is characterised in that it is manufactured from a preform as defined above and in that it has a neck with an external diameter of at least about 48 mm. Preferably,  
15        the neck has an external diameter in the range of between about 48 and 60 mm. In practice in the particular case of a large capacity bottle (about 5 litres) with a height of about 230 mm and a cambered body with a rectangular section of about 185 x 150 mm having generally rounded  
20        corners, the external diameter is approximately 50 mm.

      Although the features proposed by the invention can be used with bottles of any shape, they are particularly practical in the case of a bottle which is characterised by the fact that its neck is disposed centrally on and  
25        substantially coaxially with the body, the upper part of the body underneath the neck having an at least partially substantially flat and inclined region defining a support plane of an extension and inclination relative to the axis of the neck such that, when the bottle is set down  
30        by its support plane on a more or less horizontal support, the bottle occupies a stable position and the neck then becomes the lowest part of the bottle. A



closure device is fitted on the bottle and can be selectively manipulated to allow the liquid to flow out by under the force of gravity. Preferably the neck may have an external annular groove and the closure device  
5 can be pushed into this groove in a snap-fit action. A bottle of this type is described and illustrated in document FR 99 10605 (corresponding to UK application no. 0020239.0).

Due to the features proposed by the invention, a  
10 bottle is provided which has a more uniform wall thickness, without this improved feature adding significantly to the cost in terms of manufacturing equipment.

The invention will be more readily understood from  
15 the following description of certain embodiments, provided purely by way of illustration. Throughout this description, reference will be made to the appended drawings, of which:

- figure 1 shows a view in diametric section of a  
20 preform designed as proposed by the invention;
- figure 2 is a view in section but on a larger scale of the top part of the preform of figure 1;
- figure 3 is a side view of a bottle with a neck design as proposed by the invention; and
- 25 - figures 4 and 5 are side views of a preferred embodiment of a bottle having the design proposed by the invention, shown in two different operating positions.

Turning firstly to figure 1, a preform 1 made from a thermoplastic material such as PET, PEN or any other is  
30 illustrated in diametrical section and has a generally cylindrical shape in revolution. This preform is designed for the manufacture of large capacity bottles having a

capacity of at least approximately 5 litres by blowing or steam-blowing.

In a conventional manner, the preform 1 has a body 2 with a thick wall which is closed off at the bottom by a cambered base 3 with a spherical dome and which is terminated at the upper end by a terminal part 4 formed so as to have the shape and final dimensions of the neck of the bottle to be produced. The terminal part or neck 4 is of approximately the same external diameter as the body 2.

In order to make it easier to produce a large capacity bottle (having a capacity of at least approximately 5 litres) with a cambered body by means of a process in which the heated preform 1 is blown or steam-blown, whilst producing said bottle with a wall thickness as regular as possible, it is proposed that in order to reduce as far as possible the extent to which the thermoplastic material will be stretched, particularly in the transverse direction, the preform will be given a particularly large transverse dimension relative to its length. In particular, if the preform is to retain a standard length in the region of 130 to 150 mm, its external diameter  $\phi$  will be at least about 48 mm instead of the 25 to 27 mm usually encountered.

For practical purposes, the external diameter  $\phi$  may be in the range of between about 48 to 60 mm.

In a situation where a bottle holding approximately 5 litres is to be produced, having a height in the order of 230 mm and a body with an approximately rectangular section of about 185 x 150 mm with largely rounded edges, the external diameter  $\phi$  will preferably be about 50 mm.

On a larger scale, figure 2 illustrates the neck 4,

which has an annular groove 5 bounded at the top by a collar 6 defining the rim or lip of the neck and at the bottom by an enlarged collar 7 which may be used for automated manipulation of the preform and, later, of the finished bottle. The base of the groove 5 extends across a diameter substantially equal to the external diameter  $\phi$  of the body of the preform.

Figure 3 illustrates a side view of an example of a large capacity bottle 8 with a cambered body 9 obtained from the preform 1 illustrated in figure 1 by a process in which the heated preform is blown or steam-blown.

The bottle 8 is provided with the pre-shaped and dimensioned neck 4 of the preform 1, on which a cap 10 is placed, in this case one which is pushed into said groove 5 in a snap-fit action.

Clearly, it would not be a departure from the scope of the invention if an external thread were provided on the neck 4 to receive a screw-cap.

The neck of the bottle 8 is of a large diameter, larger than the diameter of a conventional bottle (which is in the region of 25 to 27 mm) and larger than that usually encountered in containers or bottles designed to hold several litres (for example 5 litres), where the diameter is typically in the region of 40 mm.

The features proposed by the invention seem to be particularly applicable, although not exclusively so, to a bottle such as that illustrated in an upright position in figure 4 and laid down on its side in figure 5. This type of bottle, described and illustrated in document FR 99 10605, has its neck 4 disposed centrally on and substantially coaxially (axis X) with the body 9. The top part of the body 9 underneath the neck 4 has an at least

partially substantially flat region 11 inclined relative to the axis X, which defines a support plane. This support plane is of an extension and inclined relative to the axis of the neck 4 and the body 9 such that, when the  
5 bottle 8 is laid on its support plane 11 on a more or less horizontal support 12 (figure 5), the bottle 8 occupies a stable position and the neck 4 then occupies the lowest part of the container so that the liquid product contained in it (water in particular) is able to  
10 flow out under the force of gravity.

In order to make it easier to control an outflow of liquid (for example to fill a glass), as illustrated in figures 4 and 5, the bottle 8 may be fitted with a closure device 13 which has a closure which can be  
15 axially manipulated by a button 14 using the thumb of one hand whilst the index and middle fingers are supported on an external collar 15. The liquid flows through an inclined orifice 16 which, when the bottle 8 is in the laid down position (figure 5), extends approximately  
20 vertically, said orifice being directed downwards from the support plane 11.

The closure device 13 has a hollow base 17 of a large diameter and is designed to be pushed onto said groove 5 of the neck 4 in a snap-fit action.

**CLAIMS**

1. A preform (1) made from a thermoplastic material, in particular PET, for manufacturing large capacity  
5 bottles having a capacity of at least about 5 litres by a blowing or steam-blowing process, said preform being of a generally cylindrical shape in revolution, characterised in that the preform (1), including its neck (4) which is already formed and is so to its final  
10 dimensions, has an external diameter ( $\emptyset$ ) of at least about 48 mm.

2. A preform as claimed in claim 1, characterised in that it has an external diameter ( $\emptyset$ ) in the range of about 48 to 60 mm.

15 3. A preform as claimed in claim 1 or 2, characterised in that it has an external diameter ( $\emptyset$ ) of approximately 50 mm.

4. A preform as claimed in any one of the preceding claims, characterised in that the neck (4) has an  
20 external annular groove (5), by means of which a closure of the bottle can be fixed onto the neck by a snap-fit action in said groove.

5. A preform as claimed in any preceding claim wherein the length of the preform is about 130 to 150mm.

25 6. A bottle (8) having a capacity of at least about 5 litres and being made from a thermoplastic material, in particular PET, characterised in that it is manufactured from a preform (1) as claimed in any one of claims 1 to 5, wherein said bottle has a neck (4) with an external  
30 diameter ( $\emptyset$ ) of at least approximately 48 mm.

7. A bottle as claimed in claim 6, characterised in that the neck (4) has an external diameter ( $\emptyset$ ) in the

range of about 48 to 60 mm.

8. A bottle as claimed in claim 6 or 7, characterised in that the neck (4) has an external diameter ( $\emptyset$ ) of approximately 50 mm.

5 9. A bottle as claimed in any one of claims 6 to 8, characterised in that:

its neck (4) is disposed centrally and substantially coaxially (axis X) on the body (9),

the upper part of the body (9) underneath the neck  
10 (4) has an at least partially substantially flat and inclined region (11) which defines a support plane having an extension and inclination, relative to the axis (X) of the neck (4) such that, when the bottle (8) is laid down on its support plane (11) on a more or less horizontal  
15 support (12), the bottle occupies a stable position and the neck (4) then occupies the lowest part of the bottle; and

a closure device (13) is provided on the neck (4), which can be selectively manipulated to allow the liquid  
20 to flow out under the force of gravity.

10. A bottle as claimed in claim 9, characterised in that the neck (4) has an external annular groove (5) and in that the closure device (13) is pushed into this groove (5) in a snap-fit action.



Application No: GB 0027903.4  
Claims searched: 1 to 10

Examiner: Mike Henderson  
Date of search: 19 April 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.S): B5A (AT15A AT15B AT15H AT15M AT15P) B8D (DCW9 DCW10 DCD DCE)  
Int Cl (Ed.7): B29C 49/00  
Other: ONLINE:WPI,EPODOC,JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2124543A (OWENS-ILLINOIS INC) (All Figs relevant)	1 to 8
X	EP 0247566A2 (CONTINENTAL PET TECHNOLOGIES INC) (Figs 2 & 5 particularly relevant)	1 to 8
X	EP 0199576A2 (CONTINENTAL PET TECHNOLOGIES INC) (Fig.1 particularly relevant)	1 to 8
X	US 3900120 (SINCOCK) (All Figs relevant)	1 to 8

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.